

DRAFT ALTERNATIVES

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INTRODUCTION

The Program now has 10 draft alternatives to present for review. The attached overviews of the alternatives are a preview of those that will be included in the progress report scheduled for distribution at the end of this month. Please keep in mind that these are draft alternatives and not final products. As with previous drafts, they are subject to change based on public and stakeholder input.

The 10 draft alternatives are the result of a consolidation and refinement of the 20 draft alternatives presented during meetings in February 1996. The 20 draft alternatives represented a broad range of potential solutions to Bay-Delta problems. We received considerable valuable written and verbal input on the "20" resulting from the discussions during the public workshop, the February meeting of the Bay-Delta Advisory Council, and meetings with CALFED agency staff. The Program staff considered this input, evaluated the alternatives against the Program objectives, looked for ways to refine the alternatives, and to consolidate similar alternatives.

The consolidation and refinement was not a screening process. We did not eliminate any concepts represented by the "20". The 10 draft alternatives represent the same broad range of potential solutions to Bay-Delta problems as represented by the 20 draft alternatives. Work will continue on refining, consolidation, and screening as we move towards a set of 3 to 5 alternatives. Just as previous refinements have changed the form of individual alternatives, you should expect that these alternatives will continue to change. Therefore, none of the current 10 draft alternatives are likely to make it to the set of 3 to 5 unchanged.

ALTERNATIVE OVERVIEWS

The attached overviews provide a brief narrative summary of the 10 draft alternatives. Not every feature of the alternatives is described in these overviews. For instance, adaptive management will be an important strategy to guide and adjust habitat restoration, but it is not specifically mentioned in the overviews. Detailed action by action listings of each alternative will be available as an appendix to the upcoming progress report. Each alternative overview includes a map showing major features.

CORE ACTIONS

As a reminder, a core action is an action at a specific implementation level that would be included as an element of all CALFED Program alternatives. Core actions are differentiated from other actions in the alternatives by their level of implementation and the following defining characteristics.

A core action:

- enjoys broad acceptance among stakeholders at core-level implementation
- provides a benefit to the entire Bay-Delta system
- is cost-effective
- meets one or more Program objectives
- provides some progress toward a solution but is not a satisfactory solution by itself

A core action should not:

- preclude or conflict with other actions
- increase conflicts between beneficial uses or stakeholders
- be a major program activity or major facility structure
- create significant adverse, site-specific impacts or redistribute costs (such as by infringing on existing land uses)

Because core actions are common to all alternatives, they are not described in each alternative overview. However, remember that the core actions do include significant Bay-Delta habitat restoration, upstream habitat restoration, reductions in the effects of diversions, management of anadromous fish, reduction in export reliance (demand management), water supply enhancement, increasing water supply predictability, management of water quality, and improvements to system reliability. For example, each alternative includes significant upstream habitat restoration such as California's cost share portion of restoration in CVPIA.

PHASING OF ALTERNATIVES

All alternatives can be phased over time. The individual actions included in each alternative offer many opportunities for phased implementation over short-term, intermediate-term, and long-term time frames. Phasing of action implementation offers great benefits in financing the overall program in installments. Phasing also offers potential fine-tuning the overall program solution in the future as more information becomes available.

Two example phasing diagrams are attached to show the general concept of how alternatives could be phased. These are only examples and are provided following overviews for alternatives A (Extensive Demand Management) and C (Dual Delta Conveyance). Core actions are very well suited for early implementation. Many core actions could potentially be implemented prior to selection of the preferred alternative.

Based on input received at public Workshop 5, another set of actions common to all alternatives may be well suited for early funding and implementation. These "essential elements" are briefly discussed in the following section.

ESSENTIAL ELEMENTS

During Workshop 5, we heard many comments that certain actions included in all the alternatives need to be implemented at levels higher than those represented in the core actions. For example, increased levels of demand management, more levee improvements, and more habitat above the core levels of implementation should be included in all alternatives. The term "essential elements" was suggested for a set of actions that was viewed by most to be essential to the success of any alternative. The essential elements should not be confused with the core actions since they are not subject to the same criteria as presented above for the core actions. These should be viewed as a starting set in addition to the core actions for planning early stages of Program implementation.

The attached overviews do not identify the essential elements, as work is continuing on this concept. However, the example phasing diagrams shown with alternatives A and C do show the types of actions that are being considered for inclusion as essential elements.

SUMMARY TABLE AND MATRIX

To help you organize the information contained in the alternative descriptions a table and a matrix are provided on the following pages. The table shows the major emphasis for each alternative.

The matrix provides more detail by highlighting each alternative's main approaches to achieving the primary objectives. Alternatives are listed in columns. The rows catalog the general approaches to resolving problems in the Bay-Delta. These approaches are grouped under the four primary objective areas: Water Supply, Water Quality, Ecosystem Quality, and System Vulnerability.

The summary table and matrix allow you to scan for draft alternatives containing actions or combined actions of high interest. They also enable you to compare draft alternatives quickly and easily at a general level, in order to differentiate them.

Table of Alternatives

No.	Alternative	Major Emphasis
A	Extensive Demand Management EQ: modest SV: modest WQ: modest	<ul style="list-style-type: none"> • Aggressive demand management upstream, in the Delta, and in export areas (BMP's and EWMP's to produce .5 to 1 MAF, Permanently fallow about 800,000 acres to produce 1.5 MAF, 1 MAF from Reclamation, Water bank and temporary land fallowing for 1 to 2 MAF) • 100 TAF in-Delta environmental storage
B	New Storage to Improve Delta Flow EQ: moderate SV: moderate WQ: extensive	<ul style="list-style-type: none"> • 1 to 2 MAF combined upstream storage and downstream storage • Improvement to address south Delta water quality, stage, and circulation • Increase groundwater conjunctive use (500 to 800 TAF) • Control water pollutant sources
C	Dual Delta Conveyance EQ: moderate SV: moderate WQ: moderate	<ul style="list-style-type: none"> • Screened diversion on Sacramento River and small east-side facility • Improved through-Delta conveyance • 1 to 2 MAF combined upstream and downstream storage • Permit maximum pumping capacity
D	Through Delta Conveyance EQ: moderate SV: moderate WQ: moderate	<ul style="list-style-type: none"> • Screened diversion on Sacramento River • East-side conveyance channel improvements • Supply 300 to 500 TAF from groundwater banking • 1 to 1.5 MAF downstream storage
E	Delta Channel Habitat and Conveyance EQ: moderate SV: moderate WQ: moderate	<ul style="list-style-type: none"> • Moderate level of habitat improvement to support sustainability of high-importance fish species (100 TAF San Joaquin water) • New diversion from Sacramento River to east-side channels • Extensive channel improvement to reduce velocities
F	Extensive Habitat Restoration with Storage EQ: extensive SV: extensive WQ: moderate	<ul style="list-style-type: none"> • High levels of habitat improvement to support sustainability of high-importance fish species (100 TAF of San Joaquin water) • 300 to 400 TAF in-Delta environmental storage • Extensive screening of diversions
G	East Side Foothills Conveyance EQ: moderate SV: moderate WQ: moderate	<ul style="list-style-type: none"> • 5,000 to 7,000 cfs conveyance facility • New screened diversion facilities on Feather and Sacramento Rivers • Improvement to address south Delta water quality, stage, and circulation • 100 TAF in-Delta environmental storage

Table of Alternatives

No.	Alternative	Major Emphasis
H	Chain of Lakes Conveyance EQ: moderate SV: extensive WQ: extensive	<ul style="list-style-type: none"> • Multiple 5,000 cfs diversion points • 300 to 600 TAF in -Delta storage • Extensive levee improvements
I	West Side Conveyance and River Restoration EQ: moderate SV: moderate WQ: moderate	<ul style="list-style-type: none"> • 5,000 to 10,000 cfs screened diversion at Shasta Lake • 2,000 to 7,000 cfs screened diversion at Lake Oroville • 6 to 8 MAF storage in Sacramento Valley • 10,000 to 15,000 cfs isolated transfer facility
J	East Side Conveyance EQ: extensive SV: extensive WQ: extensive	<ul style="list-style-type: none"> • 15,000 to 20,000 cfs screened diversion(s) • 15,000 to 20,000 cfs isolated transfer facility • Improvement to address south Delta water quality, stage, and circulation

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**CALFED Bay-Delta Program
Draft Alternatives**

Component	System Reoperation Alternatives			Reoperation and New Facilities Alternatives				New Facilities Alternatives		
	Extensive Demand Management	Extensive Habitat Restoration with Storage	Through Delta Conveyance	Dual Delta Conveyance	Delta Channel Habitat and Conveyance	East Side Foothills Conveyance	New Storage to Improve Delta Flow	Chain of Lakes Conveyance	West Side Conveyance and River Restoration	East Side Conveyance
	A	F	D	C	E	G	B	H	I	J
Water Supply (for all uses)										
Reduce Demand	Extensive	Modest	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Channel Capacity Improvements			High	Moderate	High		Modest			
Small Isolated Conveyance				5-7K cfs		5-7K cfs				
Large Isolated Conveyance								10-15k cfs	10-15k cfs	15-20k cfs
Upstream Surface Storage				0.5-1 MAF			0.5-1 MAF		6-8MAF	
In-Delta Surface Storage	100 TAF	400 TAF	100 TAF			100 TAF		300-600 TAF		
Downstream Surface Storage			1-1.5 MAF	0.5-1 TAF			0.5-1 MAF			
Conjunctive Use/Groundwater Banking	Extensive	Moderate	Moderate	Moderate	Moderate	Extensive	Moderate	Moderate	Moderate	Moderate
Water Transfers	Modest	Modest	Modest	High	Modest	Modest	Moderate	Modest	Moderate	Modest
Water Quality										
Pollutant Source Control	Modest	Moderate	Moderate	Moderate	Moderate	Moderate	Extensive	Extensive	Moderate	Extensive
Increase Flows for Water Quality	Modest	Modest	Modest	Moderate	Modest	Moderate	Moderate	Modest	Moderate	Modest
Ecosystem Quality										
Bay & Delta Habitat Restoration	Modest	Extensive	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Extensive
San Joaquin River Improvements	Modest	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Upper Sacramento Restoration	Modest	Extensive	Modest	Modest	Modest	Modest	Modest	Modest	Extensive	Extensive
Obtain Water for Environment		100 TAF	100 TAF	100 TAF	100 TAF	100 TAF	100 TAF	100 TAF	100 TAF	100 TAF
Relocate Export Diversion Point				Partial		Partial		Full	Full	Full
Screening Diversions	Modest	Extensive	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Extensive
System Vulnerability										
Modest Levee Improve./ Maint.	Modest									
Moderate Levee Improve./Maint.			Moderate	Moderate	Moderate	Moderate	Moderate		Moderate	
Extensive Levee Improve./Maint.		Extensive						Extensive		Extensive

Alternative A

Extensive Demand Management

Overview

This alternative will implement an extensive program of demand management actions in all water service areas dependent on the Bay-Delta watershed. These actions will produce substantial water savings, increasing water supply flexibility. This alternative will reduce fish entrainment losses by decreasing diversions from the Bay-Delta watershed and avoiding diversions during environmentally sensitive periods when fish are more vulnerable. Total diversions from the system will be reduced, allowing reservoir operation to increase spring Delta outflow as a benefit to fish transport and enhancement of ecosystem productivity. This alternative targets those levees with the highest priority to reduce system vulnerability in the Delta and improve water quality.

Extensive demand management increases flexibility and reduces entrainment

Currently, limitations on fish entrainment (take limits) are set to avoid jeopardizing fish populations. When these limits are approached, diversions are curtailed or stopped, creating a high degree of uncertainty for water users. As habitat is improved, leading to greater fish populations, the relative effect of diversions on population will be reduced. This will consequently lessen take limit constraints on diversions, providing improved water supply reliability. A program of highest-priority habitat restoration actions will be implemented to benefit fish and wildlife species and reduce constraints on water management operations caused by protection of aquatic species. Mosaics of shallow water, riverine, and riparian habitat will be restored along the Sacramento River, in the Delta and along reconstructed Delta levees. Diked wetlands near Suisun Bay will be restored to tidal action for wet year spawning and rearing of Delta smelt and rearing of salmon.

Highest priority habitats are restored

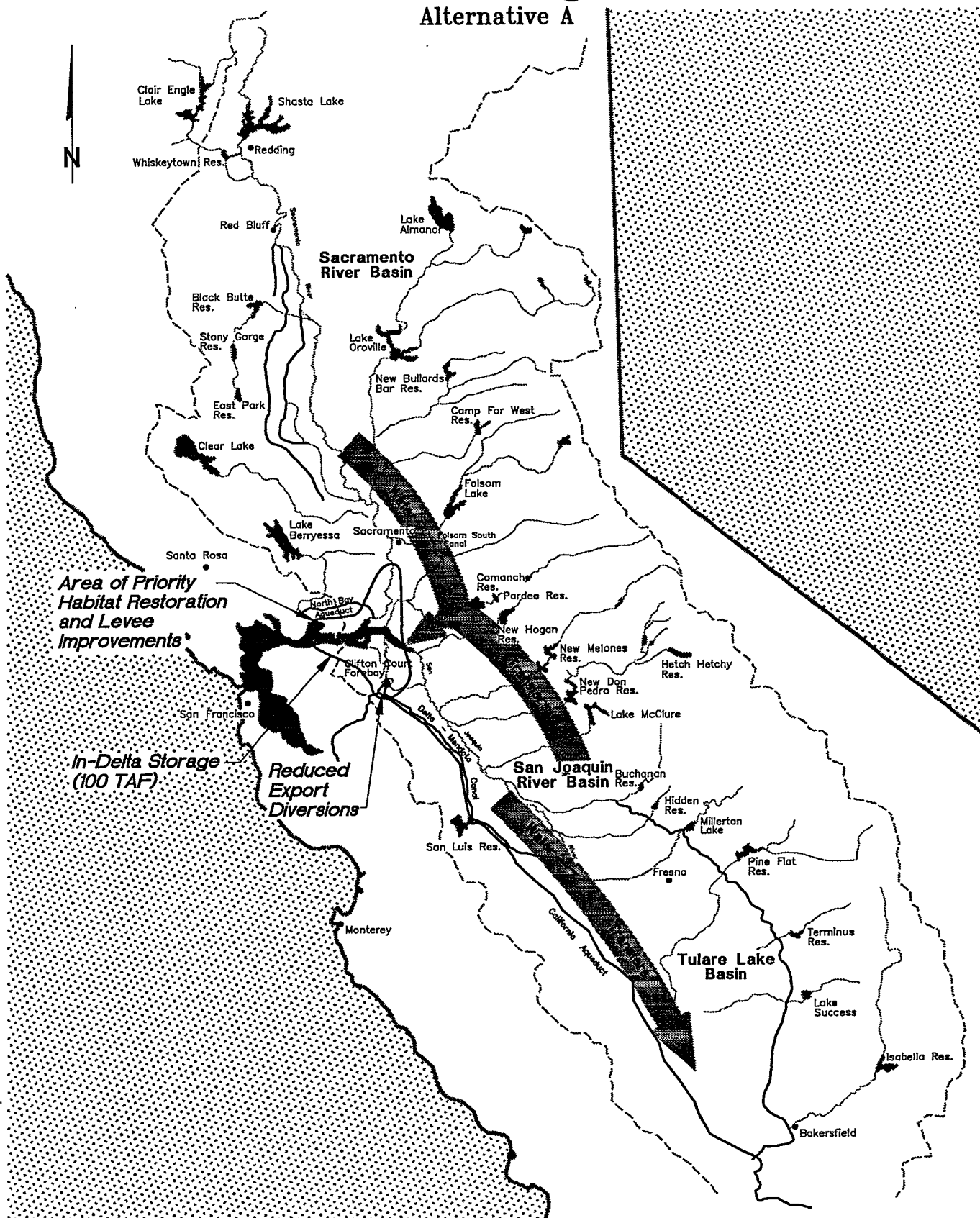
To further enhance the survival of protected aquatic species, Delta export diversions will be reduced during the spring (February-June) period to produce greater Delta outflows for fish transport and to reduce fish entrainment at the export pumps. Fish screens will be installed on high priority diversions throughout the Bay-Delta system, fish guidance facilities will be operated at the head of Old River and Georgiana Slough, and export forebay configuration and operations will be modified to reduce fish losses at the export pumps.

Several actions reduce fish entrainment

Extensive demand management including water conservation, water reclamation, and land retirement will be implemented to sustain supplies for existing water users and provide alternative supplies for other users. Intensive use of expanded urban "Best Management Practices" and agricultural "Efficient Water Management Practices" will conserve 500 TAF-1 MAF of water per year. Substantial water reclamation investments will produce approximately 1 MAF of new urban water supplies.

Extensive demand management balances supply and demand

Extensive Demand Management Alternative A



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Water pricing structures (e.g. inclining block rates) that provide incentives to conserve water will be established. About 750,000 to 850,000 acres of land will be permanently retired, reducing evapotranspiration by over 1.5 MAF per year in normal water years and conserving that water for Delta outflow and other beneficial uses. This alternative will also establish a long-term drought water bank to improve supply reliability in dry years and encourage temporary land fallowing to acquire 1 to 2 MAF for dry year transfers. Market mechanisms and incentives will facilitate water transfers.

Water management tools include pricing, land retirement, and water banking

To help allow shifts in water diversion and storage away from the spring (February-June) period, this alternative will expand conjunctive use and groundwater banking in Delta export areas. To protect Delta outflow in dry years, expanded in-lieu groundwater banking in the southern San Joaquin Valley and other areas dependent on Delta supplies will help reduce demands for surface water in those years.

Conjunctive use shifts time of diversions

Also under this alternative, approximately 100 TAF of water storage will be constructed on a south Delta island to be operated for environmental purposes. Water will be diverted onto the island through state-of-the-art fish screens at times when fish are less vulnerable. This water will be released to aid transport of fish through the Delta and to provide some water for export diversions when fish are vulnerable.

Delta water storage helps reduce entrainment

Delta water quality will be enhanced by implementing modest source-control actions for pollutants in the Bay-Delta watershed. Land retirement will focus on marginally productive lands, especially those that contribute substantially to regional drainage and water quality problems. This will improve water quality in the San Joaquin River and the south and central Delta. In addition, there will be a slight reduction in recycled salt load to the San Joaquin Valley.

Modest actions for pollutant source control

This alternative will improve high priority levees in the Delta, incorporating aquatic habitat features where levees are rebuilt. Highest priority sites will focus on islands considered critical for water quality and having both regional infrastructure facilities and valuable habitat. An emergency management plan will be established to respond to levee failure, and some funding will be made available for ongoing levee maintenance.

Levee improvements focus on high priority areas

Potential Sequencing

Stage 1. Implementation would begin with the core actions.

Core actions

Stage 2. The second stage of implementation will consist of high priority habitat restoration, installation of screens on high priority diversions, the most cost-effective actions for water conservation and reclamation, expansion of groundwater banking and conjunctive use in the highest priority sites, establishment of a long-term drought water bank, and the highest priority levee improvements. During this stage, approximately 200,000 to 300,000 acres of marginal agricultural land will be permanently retired.

Demand management, high priority habitat restoration, land retirement

Stage 3. The third stage will include expanded implementation of water conservation, reclamation, and conjunctive use actions; construction of in-Delta water storage; installation of fish guidance facilities; and retirement of 200,000 to 300,000 additional acres of agricultural land.

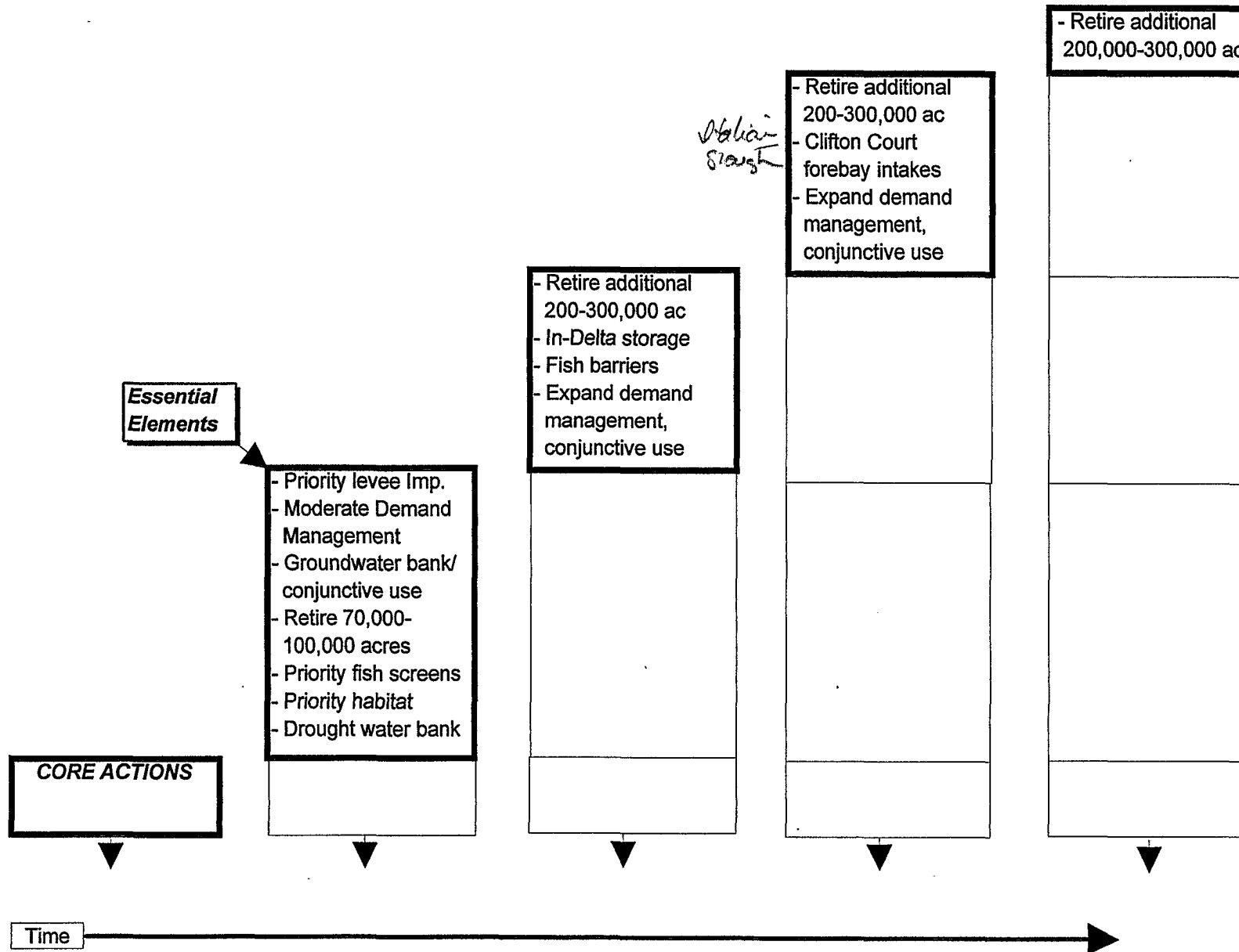
***In-Delta storage
and fish barriers***

Stage 4. In the final stage, this alternative will include achievement of the most extensive actions to expand water conservation, water reclamation, and conjunctive use. Additional agricultural land will be permanently retired to bring the total to 750,000 to 850,000 acres. Modification of the Clifton Court Forebay intake and construction of a secondary intake will be completed to reduce fish entrainment losses at the export pumps.

***Demand
management,
land retirement,
entrainment
reduction***

POTENTIAL PHASING (One example)

ALT A - EXTENSIVE DEMAND MANAGEMENT



Alternative B

New Storage to Improve Delta Flow

Overview

This alternative will include new surface storage upstream and downstream of the Delta combined with improved system operation in order to improve flows for fisheries, reduce entrainment, and increase water supply reliability and flexibility. Moderate habitat restoration will complement the reduction in entrainment and improvement in flow to increase fish populations. Aggressive source control measures improve water quality, and moderate levee improvements are made to reduce system vulnerability.

New storage improves reliability and flow conditions

This alternative will provide substantial increases in water storage capacities, both upstream and downstream of the Delta. Downstream of the Delta, storage of 0.5-1.0 MAF capacity will be constructed to integrate operational flexibility in the pattern of diversions from the Delta, upstream storage regulation, and water use patterns in all service areas dependent on Delta water supplies. Upstream of the Delta, storage of similar capacity will be constructed to expand abilities to capture peak flood flows during periods when not needed for instream uses and to manage releases of those flows to the Delta for anadromous fisheries, water quality, and water supply benefits.

New water storage is added upstream and downstream

The permitted capacity of existing export pumps will be expanded to their full physical capacity, but only during windows when fish are less vulnerable during high flood runoff periods (e.g. in late fall and early winter). Real-time monitoring will be expanded to guide pumping operations, allowing pumping to be curtailed when vulnerable fish are present. Increased flexibility in diversion capabilities, increased downstream storage, and shifts in storage windows for all upstream reservoirs will allow better avoidance of fish entrainment without reducing water supply reliability and availability. This alternative will rely on the existing configuration of Delta channels for water supply conveyance. A variety of actions will be studied and implemented to reduce adverse effects of salinity in San Joaquin River inflow, to maintain water levels and circulation in south Delta channels, and to reduce the recycled salt load to the San Joaquin Valley.

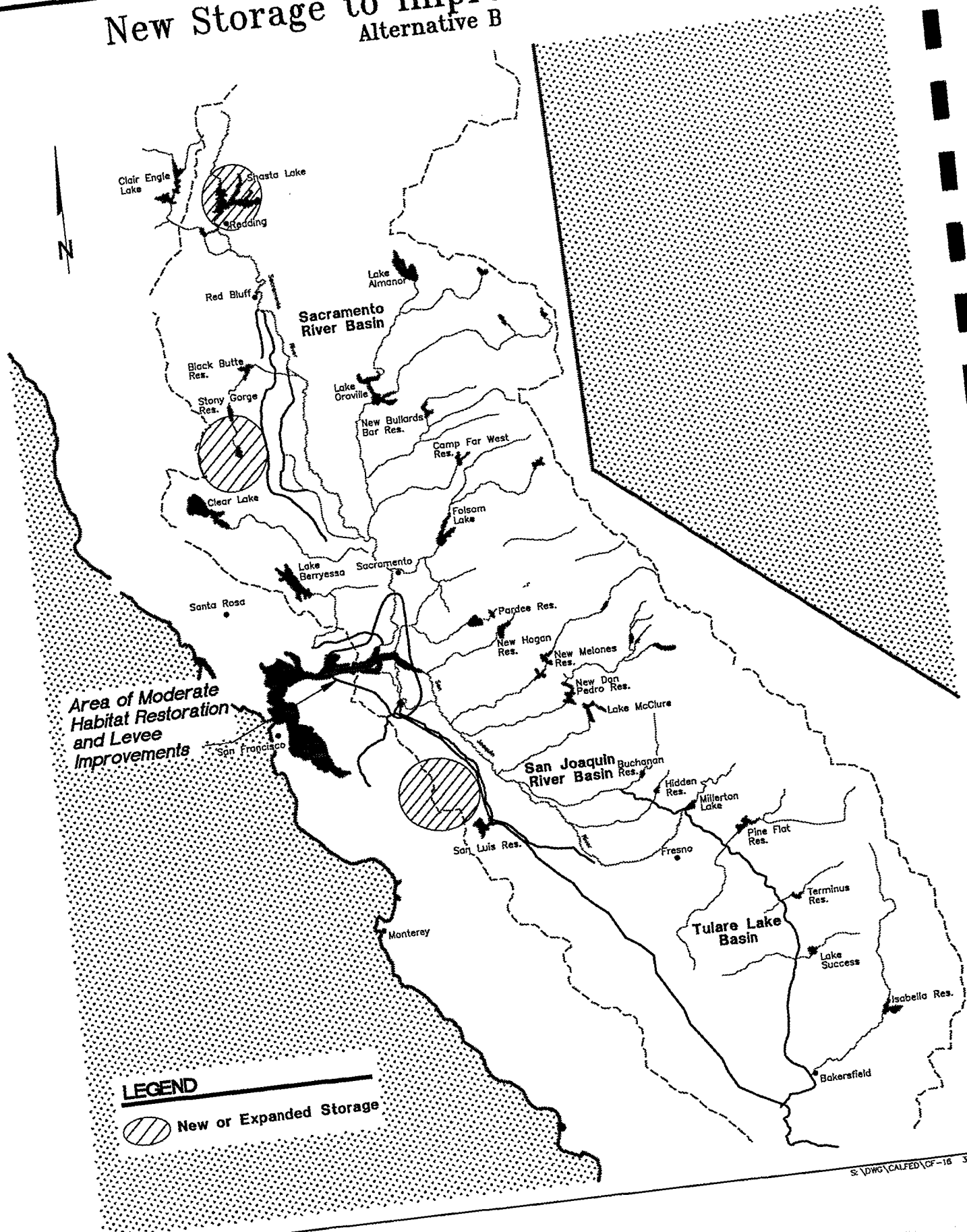
System operation is improved

This alternative will provide moderate levels of habitat along the Sacramento River downstream of Sacramento and will restore channel features on the San Joaquin River to improve survival of anadromous fish. Moderate habitat restoration in the Delta will include shallow riverine and riparian habitats to improve conditions for Delta native and anadromous fish. Moderate levels of shallow tidal habitat will be developed near Suisun Bay to benefit migrating salmon and provide spawning and rearing areas for Delta smelt.

Moderate habitat restoration upstream, in the Delta, and near Suisun Bay

New Storage to Improve Delta Flow

Alternative B



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Approximately 100 TAF of water will be obtained or developed in the San Joaquin river basin for release as spring pulse flows to improve transport of San Joaquin River fish through the Delta. Fish screens will be installed on high and moderate priority unscreened diversions throughout the Bay-Delta system and fish guidance facilities will be operated at the head of Old River and at key locations on the Sacramento River to guide fish away from the central Delta.

Water development or purchases will improve fish transport

Expanded demand management, conjunctive use, groundwater and surface banking will improve full system operational flexibility that can further reduce fish entrainment by providing more Delta flow in the critical spring period for fish (February-June). This additional Delta flow will be provided through a combination of methods that will be implemented on a priority basis. These methods include reducing consumptive use of Delta water during those months by reducing demand and switching to alternative supplies in all service areas that are dependent upon Delta water supplies; dedicating some newly developed storage to providing Delta outflow; conjunctively using groundwater basins to provide spring Delta flows; implementing conservation and reclamation actions in ways that allow shifting the timing of the releases of conserved water into the Delta during the spring; encouraging temporary land fallowing during drought periods; and making upstream reservoir storage operational changes that will provide more direct inflow to all parts of the Delta during critical spring periods.

Water bank, improved demand management help balance supply and demand

Delta and tributary water quality will be improved through aggressive source control efforts to reduce and manage discharges from agricultural operations and urban areas throughout the Bay-Delta system. Enforcement of source control regulations and implementation of Best Management Practices for salinity and pesticide residues will be expanded (e.g retention of agricultural drainage). Retirement of marginally-productive agricultural lands that contribute substantially to instream water quality problems in the San Joaquin River will be expanded. Measures to reduce the total salt load transported to the San Joaquin Valley will be implemented. Pollutants in San Joaquin River inflow will be diluted using water purchased or developed in the San Joaquin River basin.

Aggressive pollutant source control improves water quality

This alternative provides moderate levee improvements to reduce system vulnerability, establishes an emergency management plan to respond to levee failure, and provides funds for ongoing maintenance. Levee improvements will target levees that protect infrastructure, western Delta islands that are critical for water quality, population centers, and valuable habitats.

Moderate levee improvements

New storage and improved system operations increase water supply reliability and flexibility while improving flow conditions for fish. Levee rehabilitation that incorporates habitat improvements can simultaneously reduce system vulnerability, increase ecosystem quality, and improve water quality.

Actions provide multiple benefits

Potential Sequencing

Stage 1. Implementation will begin with the core actions.

Core Actions

Stage 2. Actions implemented during Stage 2 of this alternative will include establishment of a permanent drought water bank, implementation of a moderate demand management program, high priority improvements to levees and flood channels in the Delta, high priority habitat restoration actions, and installation of high-priority fish screens. Stage 2 will include retirement of approximately 70,000 to 100,000 acres of marginally productive agricultural lands in the San Joaquin Valley. Also during Stage 2, expanded real-time monitoring will be implemented to allow the Delta export pumps to be operated at full capacity during safe periods and to minimize entrainment of sensitive fish during vulnerable periods. Groundwater banking programs in the San Joaquin Valley and other service areas dependent on Delta water will be expanded.

*Demand
management and
habitat
restoration*

Stage 3. In Stage 3, downstream water storage will be constructed to further increase capabilities to manage both Delta exports and upstream reservoir storage operations to avoid entrainment effects while maximizing the utility of Delta water. Additional San Joaquin River water for spring pulse flows will be obtained, and moderate priority levee and flood control improvements, habitat restoration actions, and fish screen installations will be implemented. An additional 200,000 to 300,000 acres of marginally productive agricultural lands in the San Joaquin Valley will be retired during this stage.

*Downstream
storage, San
Joaquin flows*

Stage 4. Stage 4 will consist of constructing water storage upstream of the Delta to maximize flexibility in managing flows through the Delta for supporting all beneficial uses. Operational standards for this storage facility will specify the sharing of stored water among environmental and water supply uses. For example, stored water will be used to improve upstream anadromous fish habitat, manage water quality in the Delta, and provide more flexible water supplies.

*Upstream
storage*

Alternative C

Dual Delta Conveyance

Overview

This alternative will include a new screened diversion facility on the Sacramento River between Hood and Freepoint. This diversion facility will supply a new small isolated conveyance facility that will transport water around the east side of the Delta to the existing south Delta pumping plants. The new screened diversion facility will also supply water for continued through-Delta conveyance. Fish entrainment will be substantially reduced, and isolation of some diversions from Delta channels will improve export water quality. New surface storage upstream and downstream of the Delta will be built to improve flows for fisheries while increasing water supply reliability and flexibility. Moderate habitat restoration will complement the reduction in entrainment and improvement in flow to increase fish populations. Source control measures will improve water quality, and moderate levee improvements will reduce system vulnerability.

New storage and conveyance improve reliability, flow conditions, water quality

The new dual diversion facility on the Sacramento River will be equipped with state-of-the-art fish screens to minimize entrainment of fish. Real-time monitoring will be used to shift diversions among multiple intakes and thus avoid entrainment effects during critical periods of fish out-migration or spawning. A new canal, isolated from Delta channels, will be constructed to convey water (approximately 5,000-7,000 cfs) from the new diversion point to the existing Banks and Tracy Pumping Plants. The isolated facility will be sized to supply the majority of Delta export needs during sensitive spring periods and to potentially provide drinking water supplies to some users in Sacramento County, San Joaquin County, and the Bay Area. The conveyance facility will include siphons under all important stream courses to prevent disruption of water quality and aquatic habitat values in the streams.

Dual diversion and small isolated conveyance protect water quality and fish

Improvements to north Delta channels will provide multiple benefits for flood conveyance, habitat restoration, water supply, and south Delta water quality. A variety of actions will be studied and implemented to reduce adverse effects of salinity in San Joaquin River inflow, to maintain water levels and circulation in south Delta channels, and to reduce recycled salt load to the San Joaquin Valley.

Some through-Delta conveyance continues

Water storage facilities with a combined capacity of 1-2 million acre-feet will be constructed upstream and downstream of the Delta to increase the capability to capture, store, and use flows for environmental and water supply benefits. Increased upstream water storage will be used in concert with reoperation of many upstream reservoirs to provide water to improve anadromous fish habitat and flows to transport fish through the Delta.

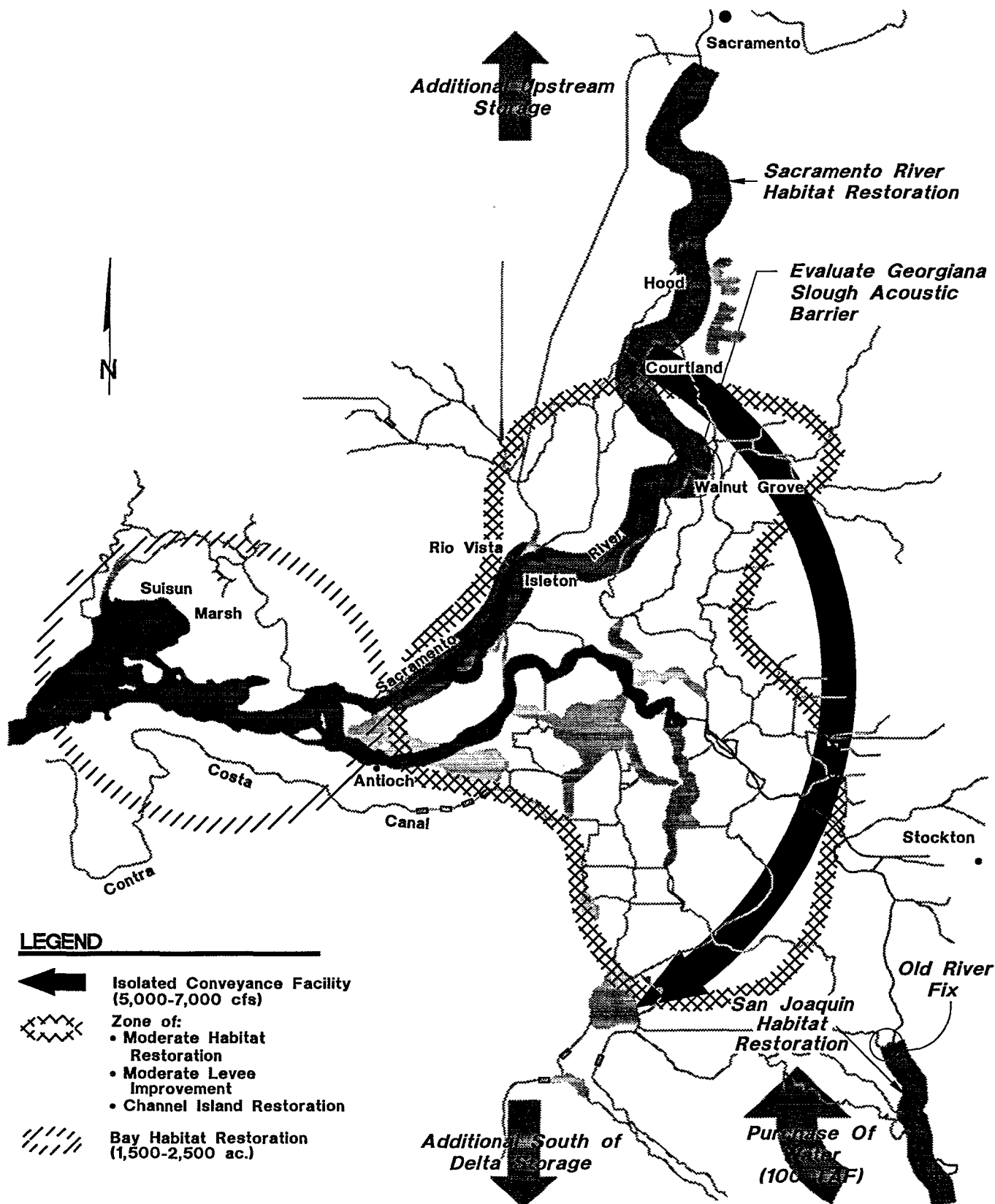
New water storage is added upstream and downstream

The permitted capacity of existing export pumps will be expanded to their full physical capacity, but only during windows when fish are less vulnerable during high flood runoff periods (e.g., in late fall and early winter). Real-time monitoring will be expanded to guide pumping operations, allowing pumping to be curtailed

System operation is improved

Dual Delta Conveyance

Alternative C



when vulnerable fish are present. Construction of water storage facilities downstream and upstream of the Delta and expanded conjunctive use programs in the San Joaquin Valley and other service areas will greatly increase water management flexibility to utilize Delta water for consumptive use during less environmentally damaging periods (e.g. late fall and early winter), thus avoiding entrainment of vulnerable fish while maintaining the total volume of Delta water use.

This alternative will provide moderate levels of habitat along the Sacramento River downstream of Sacramento and will restore channel features on the San Joaquin River to improve survival of anadromous fish. Moderate habitat restoration in the Delta will include shallow riverine and riparian habitats to improve conditions for Delta native and anadromous fish. Moderate levels of shallow tidal habitat will be developed near Suisun Bay to benefit migrating salmon and provide spawning and rearing areas for Delta smelt.

Moderate habitat restoration upstream, in the Delta, and near Suisun Bay

Reduction of San Joaquin River reverse flows during export pumping in the south Delta in combination with moving the diversion point for the balance of exports will minimize entrainment of fish during more vulnerable periods. Water (approximately 100 TAF) will be obtained or developed in the San Joaquin River basin for release as spring pulse flows to improve transport of San Joaquin River fish through the Delta. Fish screens will be installed on high and moderate priority unscreened diversions throughout the Bay-Delta system and a fish guidance system will be implemented at the head of Old River.

Improvements in flow, and new screens, reduce entrainment

Expanded demand management, conjunctive use, groundwater and surface banking will improve full system operational flexibility that can further reduce fish entrainment by providing more Delta flow in the critical spring period for fish (February-June). This additional Delta flow will be provided through a combination of methods that will be implemented on a priority basis. These methods include reducing consumptive use of Delta water during those months by reducing demand and switching to alternative supplies in all service areas that are dependent upon Delta water supplies; dedicating some newly developed storage to providing Delta outflow; conjunctively using groundwater basins to provide spring Delta flows; implementing conservation and reclamation actions in ways that allow shifting the timing of the releases of conserved water into the Delta during the spring; and making upstream reservoir storage operational changes that will provide more direct inflow to all parts of the Delta during critical spring periods.

Water bank, improved demand management help balance supply and demand

Delta and tributary water quality will be improved through source control efforts to reduce and manage discharges from agricultural operations and urban areas throughout the Bay-Delta system. Retirement of marginally-productive agricultural lands that contribute substantially to instream water quality problems in the San Joaquin River will be expanded. Measures to moderately reduce the total salt load transported to the San Joaquin Valley will be implemented. Pollutants in San Joaquin River inflow will be diluted using water purchased or developed in the San Joaquin River basin.

Pollutant source control

This alternative provides moderate levee improvements to reduce system vulnerability, establishes an emergency management plan to respond to levee failure, and provides funds for ongoing maintenance. Levee improvements will target levees that protect infrastructure, western Delta islands that are critical for water quality, population centers, and valuable habitats. Levee improvements will incorporate habitat restoration.

Moderate levee improvements

A range of diversion points from Hood through Freeport are possible on the Sacramento River below the confluence with the American River. A variation of those diversions that can be investigated is a diversion point upstream of Bryte that utilizes either the Yolo Bypass or the Sacramento Ship Channel to convey water south to Liberty Island and then crosses Ryer Grand Islands, siphons under the Sacramento River, and rejoins the previously discussed eastern canal alignment.

Optional diversion points

New storage and conveyance increase water supply reliability and water quality while improving flow conditions for fish and reducing entrainment. Levee rehabilitation incorporates habitat improvements while simultaneously reducing system vulnerability, increasing ecosystem quality, and improving water quality.

Actions provide multiple benefits

Potential Sequencing

Stage 1. Implementation will begin with core actions.

Core actions

Stage 2. Actions implemented during Stage 2 of this alternative will include establishment of a permanent drought water bank, implementation of a moderate demand management program, high priority improvements to levees and flood channels in the Delta, high priority habitat restoration actions, and installation of high-priority fish screens. Approximately 70,000-100,000 acres of marginally productive agricultural lands in the San Joaquin Valley will be retired. Expanded real-time monitoring will be implemented to allow the Delta export pumps to be operated at full capacity during safe periods and provide operational flexibility to avoid fish entrainment during vulnerable periods. Groundwater banking programs in the San Joaquin Valley and other service areas will be expanded.

Demand management and habitat restoration

Stage 3. In Stage 3, downstream water storage will be constructed to increase capabilities to coordinate Delta water use and shifted upstream reservoir storage operations to avoid entrainment effects while maximizing the utility of water for users. Storage upstream of the Delta will be constructed to maximize flexibility in managing flows through the Delta for supporting environmental, water quality, and water supply uses. Additional San Joaquin River water for spring pulse flows will be obtained or developed, and moderate priority levee and flood control improvements, habitat restoration actions, and fish screen installations will be implemented. An additional 200,000 to 300,000 acres of marginally productive agricultural lands in the San Joaquin Valley will be retired during this stage. To test screening technologies, a small screened diversion from the Sacramento River to Snodgrass Slough will be constructed.

New storage, demand management, levee improvements